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TO: Office of Grants and Research Contracts
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National Aeronautics and Space Administration
Washington 25, D.C.

FROM: Professor H.D. Greyber
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SUBJECT: Semi-annual status report on NASA Research Grant NsG-310-63 to Northeastern University Boston, Mass.

Gentlemen:

This semi-annual status report covers the period from March 15, 1963 to September 15, 1963.

During this time the research effort was concentrated on the problem of the radiation that should be expected in the various frequency ranges upon the galactic dipole magnetic field model. Mr. Donald Goldsmith, at that time a senior in astronomy at Harvard College, was employed on the grant from March 15, 1963 to June 5, 1963 and performed many calculations on the cyclotron radiation to be expected from non-relativistic electrons in the dipole magnetic field of a spiral galaxy. The power spectrum was derived and estimates made for a typical galaxy such as our own.

A paper embodying these results was presented at the regular meeting of the American Astronomical Society in Fairbanks, Alaska, July 22-24, 1963. Although the estimates are necessarily crude, it is important to note that the results predict a radio source like Sagittarius A in the vicinity of the galactic center but attaining a maximum somewhere in the frequency range from 10 kcs to 1 mcs. It is interesting to observe that the most recent Harvard College rocket flight to observe low frequency cosmic radio noise

(Lilley, Hugenin et al) found to their surprise that the radio intensity at 750 kcs was definitely higher than that at 1.5 mcs.

Their flight was apparently sufficiently high to make this a definite conclusion. However no location of the source was possible with their rocket type observations, and only a tentative suggestion of agreement with theory can be concluded.

Work is continuing on the radiation to be expected from the relativistic electrons in the dipole magnetic field and from the electrons in the current loop. In connection with the relativistic electrons and their synchrotron radiation we have been aided by a talk with Mr. K.S. Thorne (Princeton University) who wrote a paper for the Astrophysical Journal Supplements on a very similar topic. His concern was however for the radiation from the dipole magnetic field of a star or planet.

Over the Summer no graduate student was employed on the grant as I spent 4 weeks at the Summer Institute of Theoretical Physics, University of Colarado in Coulder, Colorado. On September 5, 1963, Mr. Joseph Chapley, a graduate student in physics, began employment on the grant. He had no knowledge of astronomy or astrophysics when commencing work and so for many months his contribution must be limited to routine calculations, and study of the background material.

In Colorado, lectures by H.Y. Chiu, William Fowler and S. Chandraskhar on various current topics of active research interest in astrophysics were attended and some useful conversations were held on the research problems relating to the grant.

M 82 is still the classic example of a galactic magnetic field of dipole character with an orientation of the axis of the field along the minor